

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/262734183>

# Priority setting for the prevention and control of cardiovascular diseases: multi-criteria decision analysis in four eastern Mediterranean countries

Article in *International Journal of Public Health* · May 2014

DOI: 10.1007/s00038-014-0569-3 · Source: PubMed

READS

99

15 authors, including:



**Niveen ME Abu-Rmeileh**

Birzeit University

89 PUBLICATIONS 2,333 CITATIONS

[SEE PROFILE](#)



**Fouad M. Fouad**

American University of Beirut

105 PUBLICATIONS 1,192 CITATIONS

[SEE PROFILE](#)



**Radwan Al Ali**

Syrian Center for Tobacco Studies

41 PUBLICATIONS 204 CITATIONS

[SEE PROFILE](#)



**Aissi Wafa**

Institut Pasteur de Tunis

8 PUBLICATIONS 19 CITATIONS

[SEE PROFILE](#)

# Priority setting for the prevention and control of cardiovascular diseases: multi-criteria decision analysis in four eastern Mediterranean countries

Rula Ghandour · Azza Shoaibi · Rana Khatib · Niveen Abu Rmeileh · Belgin Unal · Kaan Sözmen · Bülent Kılıç · Fouad Fouad · Radwan Al Ali · Habiba Ben Romdhane · Wafa Aissi · Balsam Ahmad · Simon Capewell · Julia Critchley · Abdullatif Husseini

Received: 26 October 2013 / Revised: 7 May 2014 / Accepted: 12 May 2014  
© Swiss School of Public Health 2014

## Abstract

**Objectives** To explore the feasibility of using a simple multi-criteria decision analysis method with policy makers/key stakeholders to prioritize cardiovascular disease (CVD) policies in four Mediterranean countries: Palestine, Syria, Tunisia and Turkey.

**Methods** A simple multi-criteria decision analysis (MCDA) method was piloted. A mixed methods study was used to identify a preliminary list of policy options in each country. These policies were rated by different policy-makers/stakeholders against pre-identified criteria to generate a priority score for each policy and then rank the policies.

**Results** Twenty-five different policies were rated in the four countries to create a country-specific list of CVD prevention and control policies. The response rate was 100 % in each country. The top policies were mostly population level interventions and health systems' level policies.

**Conclusions** Successful collaboration between policy makers/stakeholders and researchers was established in this small pilot study. MCDA appeared to be feasible and effective. Future applications should aim to engage a larger, representative sample of policy makers, especially from outside the health sector. Weighting the selected criteria might also be assessed.

---

This article is part of the supplement “The rising burden of noncommunicable diseases in four Mediterranean countries and potential solutions”.

---

**Electronic supplementary material** The online version of this article (doi:[10.1007/s00038-014-0569-3](https://doi.org/10.1007/s00038-014-0569-3)) contains supplementary material, which is available to authorized users.

---

R. Ghandour (✉) · A. Shoaibi · R. Khatib · N. Abu Rmeileh · A. Husseini  
Institute of Community and Public Health, Birzeit University, Birzeit, Palestine  
e-mail: [rghandour@birzeit.edu](mailto:rghandour@birzeit.edu)

B. Unal · K. Sözmen · B. Kılıç  
Department of Public Health, Faculty of Medicine, Dokuz Eylül University, 35340 İnciraltı, İzmir, Türkiye

F. Fouad · R. Al Ali  
Syrian Center for Tobacco Studies, Aleppo, Syria

H. Ben Romdhane · W. Aissi  
Cardiovascular Disease Epidemiology and Prevention Research Laboratory, Faculty of Medicine, University Tunis El Manar, Tunis, Tunisia

**Keywords** Multi-criteria decision analysis · Priority setting · Decision-making process · Low middle income countries · Cardiovascular diseases

B. Ahmad  
Institute of Health and Society, Newcastle University, Newcastle, UK

S. Capewell  
Department of Public Health and Policy, Institute of Psychology, Health and Society, University of Liverpool, Liverpool, UK

J. Critchley  
Division of Population Health Sciences and Education, St George's, University of London, London, UK

A. Husseini  
Public Health Program, Department of Health Sciences, Qatar University, Doha, Qatar

## Introduction

Non-communicable diseases (NCDs), including cardiovascular diseases (CVDs), are the leading causes of death worldwide with 80 % occurring in low and middle income countries (LMIC) (WHO 2011). According to the World Health Organization (WHO), deaths from NCDs—if not targeted—will increase by 17 % globally and by 25 % in the Eastern Mediterranean region (EMR) in the coming 10 years (WHO 2008). CVDs constitute a major proportion of the NCDs, making them the number one leading cause of death in most LMIC and the EMR. Most deaths occur at socially and economically active ages (Miranda et al. 2008), with 29 % of deaths occurring before the age of 60 in LMIC (WHO 2011). Although morbidity data are scarce and not always reliable in LMIC, the available data suggest increasing burden of CVDs (Abu-Rmeileh et al. 2012). In most LMIC, the populations are highly exposed to known CVD risk factors and appropriate prevention programmes are not always established. Evidence from some Arab EMR countries shows an increase in CVD risk factors—including smoking, overweight, obesity and physical inactivity (Jabbour et al. 2012).

The importance of NCDs and their impact not only on health but on social and economic life are well recognized. However, the outcomes reflect a gap between the burden of NCDs and the strategies adopted. In the EMR, policies targeting the major NCDs and their risk factors are limited, and when available, the implementation process is generally fragmented and poorly coordinated (Jabbour et al. 2012). Hence, there is an urgent need to identify and set priorities within local decision-making processes. That might not be an easy task, taking into consideration the dual burden of communicable and NCDs in LMIC, the limited financial resources and the competing priorities (Gibson et al. 2004).

Setting priorities and decision-making are multi-dimensional processes. Different models to explain the decision-making processes are available. Evidence-based research should play a critical role in the decision-making and priority-setting process by providing evidence on the effectiveness and efficiency of alternative policies (Mendis and Alwan 2011). In the field of public health, evidence has demonstrated that decision-makers alone are often not “well placed” to make informed decisions. They sometimes set priorities on an ad hoc basis and not based on clear evidence (Baltussen and Niessen 2006). Also previous experiences in utilizing research findings in decision-making processes have highlighted gaps between research findings and adopted policies. Such gaps might be due to the academic style of reporting results which might not be well understood by decision-makers; research results that

are not timely; and long lists of researchers’ recommendations (AHPSR 2004).

Although perceived to be an important issue, there is no consensus on how priority setting should be done. Moreover, in a context of wide range of needs and limited resources, there should be a rational way to trade-off between different priorities and select the most important and relevant to local needs. Even if reliable data on effectiveness and cost-effectiveness of these interventions are available, still there is a need to consider ethical and social concerns in selecting the most appropriate one. This has demonstrated the requirement for multiple criteria to set priorities and highlighted the need for a methodology to utilize multiple dimensions of information in decision-making, and yet be relatively conclusive and straightforward to implement (Baltussen et al. 2007; Koopmanschap et al. 2010).

In this context, different methods have been proposed starting from simple checklists and guidelines to more complicated approaches such as economic evaluation (Kapiriri and Norheim 2004). These include but are not limited to the WHO stepwise framework (Epping-Jordan et al. 2005), the prioritized research agenda suggested by the WHO (Mendis and Alwan 2011), the Child Health and Nutrition Research Initiative (CHNRI) (Rudan et al. 2008), and the multi-criteria decision analysis (MCDA) (Baltussen and Niessen 2006).

### Multi-criteria decision analysis (MCDA)

MCDA is a method that has been developed in response to awareness that decision-makers often do not use a rational approach in decision-making, and criticisms of previous attempts to prioritize health policies on one criterion only. In addition to that, many decision-making approaches rarely considered the societal perspective and the multi-disciplinary nature of health interventions (Baltussen and Niessen 2006).

MCDA is defined as: “a set of methods and approaches to aid decision-making where decisions are based on more than one criterion, which make explicit the impact of all the criteria applied and the relative importance attached to them” (Youngkong et al. 2012a). MCDA has many applications in marketing, agricultural and environmental studies, but fewer in health (Youngkong et al. 2012b). However, MCDA was used as early as 2000 in the Netherlands to assess the most important health problems, as well as the efficiency of the health care system (Bots and Hulshof 2000). It has also been used in Nepal (Baltussen et al. 2007), Thailand (Youngkong et al. 2012a, b), Ghana (Baltussen et al. 2006) and Uganda (Kapiriri and Norheim 2004).

The MCDA attempts to explicitly take into account a range of criteria which decision-makers could use to inform priority setting and provide a rational approach to ranking priorities for implementation. The criteria put forward have varied, but commonly include the “burden of disease”, considerations of ethical, social, equity values and cost-effectiveness analysis. Methods of analysis included both qualitative and quantitative methods and also vary from simple summation to complex weighting and multi-variable analysis. Whilst a significant body of research has discussed the potential benefits of MCDA for health decision-makers, relatively little empirical research has attempted to assess the feasibility of using such methods in practice (Baltussen and Niessen 2006).

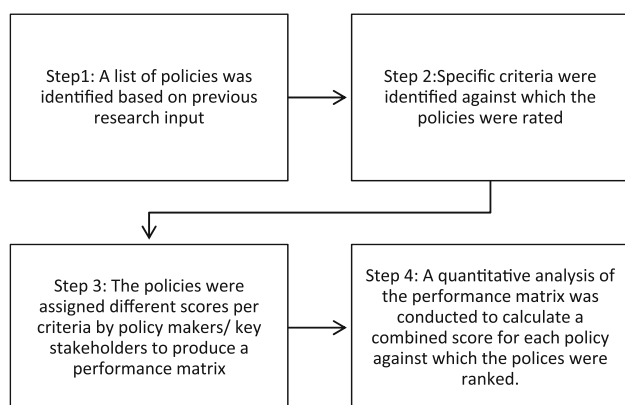
This paper discusses the process and the feasibility of using a simple MCDA approach to rank a list of CVD policies with key decision-makers/stakeholders in four EMR countries: Palestine, Syria, Tunisia and Turkey. The four countries are middle income countries facing a critical and growing burden of NCDs, in addition to many other health system-related challenges (Maziak et al. 2013). This setting is optimal to pilot the MCDA.

## Methods

The methodology of this study was based on a simple MCDA framework applied in four EMR countries (Palestine, Syria, Tunisia and Turkey). It included four major steps (see Fig. 1). These steps are described below.

### Selection of CVD prevention and control policies/interventions

The initial list of CVD prevention and control policies that were prioritized in this study arose from a multinational



**Fig. 1** Adapted framework for the multi-criteria decision analysis (MCDA) applied in four eastern Mediterranean countries (2011)

research that involved the four countries—the MedCHAMPS study (Mediterranean Studies of CVD and Hyperglycaemia, Analytical Modeling of Population Socio-economic transitions project). MedCHAMPS was conducted in the four countries between 2009 and 2013. The overall aim of the MedCHAMPS project was to advise on the policies most likely to be effective in reducing the burden of CVD and diabetes in these countries. The methodological details have been published elsewhere (Maziak et al. 2013; Bowman et al. 2012). In brief, the project developed a mixed methods framework, including the involvement of key decision-makers/stakeholders to generate an expanded list of policy options for the prevention and control of CVDs in each country. The qualitative methods included a country-specific situational analysis (Phillimore et al. 2013) and the quantitative adapted the widely used CHD IMPACT mortality model for this region (Abu-Rmeileh et al. 2012). Combining results from this mixed methods-based study in the four countries generated a list of 32 different CVD prevention and control policies targeting four different levels: (1) general population level policies (primary prevention), (2) policies targeting high risk groups (primary prevention), (3) patient treatment policies (interventions focused on the use of pharmaceuticals such as multi-drug regimen for primary or secondary prevention) and (4) policies targeting the health system (see Supplementary Appendix 1). However, country-specific lists had lesser policies. In addition, there was an assumption based on extensive field experience of the research teams that long lists will affect the response (i.e. decision-makers will avoid completing questionnaires that appear too detailed). In an attempt to make the lists as concise as possible, the research teams from each country shortlisted a list of 10–20 CVD prevention and control policies (from the 32) that they considered most relevant to their countries. The researchers based their selection on knowledge gained through conducting a comprehensive situational analysis in each country (Phillimore et al. 2013), in addition to previous experience.

### Criteria

Taking into consideration each country’s needs, and different ethical, social and equity values, five different criteria were identified to rate different CVD prevention and control policies in our study. These were based on the WHO stepwise framework, (Epping-Jordan et al. 2005), and the prioritized research agenda for the prevention and control of NCDs (Mendis and Alwan 2011). The WHO stepwise framework proposes a multi-step framework to assist organizations in identifying and prioritizing evidence-based interventions, whilst the WHO prioritized

**Table 1** Selected criteria against which cardiovascular diseases (CVD) prevention and control policies were rated in a multi-criteria decision analysis (MCDA) applied in four eastern Mediterranean countries (2011)

Criteria	Definition	Scoring	Source/reference
Acceptability	Acceptability of implementing such intervention by the general population	0: Not acceptable 5: Totally acceptable	WHO Prioritized Research Agenda for Prevention and Control of Noncommunicable Diseases
Affordability	If it is affordable to implement such policy taking into consideration the current resources	0: Not affordable 5: Totally affordable	Researchers/key informants
Availability	If the policy is available (fully or partially) or missing	0: Available 5: Missing	Researchers/key informants
Feasibility	Feasibility of application in low resources setting	0: Not feasible 5: Totally feasible	WHO Prioritized Research Agenda for Prevention and Control of Noncommunicable Diseases
Core/expanded/desirable	<i>Core</i> related to policies that can be implemented in a short term period (5 years) with the available resources. <i>Expanded</i> refers to policies that can be implemented within a medium term (around 10 years) with the projected available resources. <i>Desirable</i> refers to evidence-based policies that are beyond the application with the existing or projected resources in the long term (more than 15 years)	0: Desirable 3: Expanded 5: Core	WHO Prioritized Research Agenda for Prevention and Control of NCDs and WHO stepwise framework

research agenda aimed to provide some guidelines on the national NCD research priorities and a way of translating research into practice. In addition, criteria were also based on input from researchers, decision-makers and key informants (Phillimore et al. 2013), an approach which has been trialled previously (Baltussen et al. 2006; Kipiriri and Norheim 2004). These criteria were as follows acceptability by the general population, affordability for governments to implement with the available resources, feasibility in low resources settings (Mendis and Alwan 2011), availability of such policies in the country and the estimated time of application (core/expanded/desirable) (Epping-Jordan et al. 2005). Table 1 summarizes the selected criteria. A metric-based approach was used to score the selected policies. A score on a scale of 0–5 was proposed for each of the five criteria to be evaluated by decision-makers/key stakeholders (Viergever et al. 2010), except for the availability criterion, and it was scored as dichotomous in which 0 score was given to available policy and five was given to missing one. Although burden of disease and cost-effectiveness criteria are both important in such analysis, they were excluded from this MCDA for scientific or practical reasons. The burden of disease was an important component already used in shortlisting the policies (part of the MedCHAMPS prior situational analysis) (Phillimore et al. 2013). And the shortage of data and decision-maker's lack of understanding of cost-effectiveness analyses limited their use in this study.

#### Selection of decision-makers/stakeholders and process of getting their feedback

To evaluate CVD prevention and control policies, a form was developed containing the policies and the criteria to be shared with decision-makers/stakeholders (see Supplementary Appendix 2). At least, five decision-makers/stakeholders per country were approached to score the policies. They were selected from pre-identified lists that were prepared in a previous stage of the MedCHAMPS project (Phillimore et al. 2013). In selecting the decision-makers, we aimed to cover multiple levels of the hierarchy of the local decision-making process within the health system. We also attempted to ensure “diversity” in terms of geographical location, roles in the health system, gender, type of provider and others. Based on that, decision-makers/stakeholders were individuals involved in national decision-making (such as the head of primary health care divisions) and individuals involved in implementation (such as regional officers, heads of subdivisions, programme coordinators), practitioners (physicians, nurses) and senior academic researchers (see Table 2).

The forms were shared with the decision-makers/stakeholders, either during face-to-face interviews (Syria, Tunisia) or by fax/email (Palestine, Turkey). The criteria and scoring process were explained and discussed with them face-to-face or by telephone, and then they were asked to rate the policies against the criteria mentioned. All those approached returned

**Table 2** List of policy makers/key stakeholders who evaluated cardiovascular diseases (CVD) prevention and control policies using a multi-criteria decision analysis (MCDA) in four eastern Mediterranean countries (2011)

Policy makers/key stakeholders	Palestine	Syria	Tunisia	Turkey
Director of the primary health care department/NCD unit—MoH	1	1	1	
Director of diabetes centre/supervision—Hospital	1		1	
Dean of the Faculty of Medicine	1			
Director/coordinator of the NCD centre—MoH	1		1	1
Director of the disease control	1			
Director of district diabetes programme		1		
Director, Training and Rehabilitation department		1		
Director, Hospital Management department		1		
General district health director		1		
Head of Research Laboratory “Epidemiology and Prevention of CVDs”			1	
Head of National Observatory of New and Emerging Diseases			1	
Academics (cardiologists, endocrinologists)				3

the completed scores within a 2-week period. The forms were translated into Arabic (the official language) and cross-checked in three of the four countries: Palestine, Syria and Tunisia. In Turkey, the English version was used.

#### Developing the performance matrix and prioritizing CVD prevention and control policies

A tabular summary or “performance matrix” showing the evaluation of each CVD prevention and control policy against each criterion was produced. (Baltussen and Niessen 2006). The selected policies on different levels (rows), countries and criteria (columns) were included in the performance matrix (see Supplementary Appendix 3). “A *simple linear additive evaluation model*” was adopted to calculate the overall priority score for each policy for each country. The un-weighted sum for the scores was used to represent the priority score for each policy assessed; the score could therefore range from 0–25. The use of weights for different criteria has been discussed in MCDA, but in the absence of any empirical evidence to attach weights to different criteria, we used an un-weighted model. Based on these priority scores, the policies were ranked in terms of their importance.

This paper highly focuses on steps 3 and 4 of the MCDA as applied during the MedCHAMPS study since steps 1 and

**Table 3** Range for priority scores by country for cardiovascular diseases (CVD) prevention and control policies evaluated using a multi-criteria decision analysis in four eastern Mediterranean countries (2011)

Country	N*	Min	Max	Range
Palestine	19	15.3	23	7.7
Syria	19	12.6	22.7	10.1
Tunisia	19	12.7	20.6	7.9
Turkey	13	12.3	20.8	8.5

\* N number of evaluated policies

2 were covered previously (Phillimore et al. 2013; Abu-Rmeileh et al. 2012; Maziak et al. 2013).

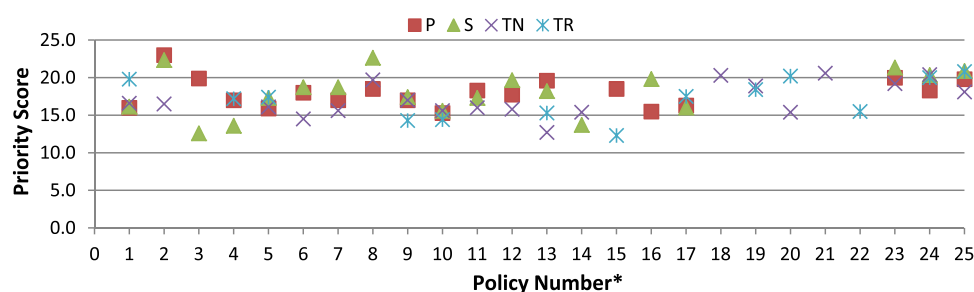
## Results

From a pre-identified list of CVD prevention and control policies (32) operating on four main different levels (Supplementary Appendix 1), country-specific policies were selected by the research team for further consideration with decision-makers/stakeholders. A list of 25 overlapping policies was selected as follows: 19 policies in Palestine, Syria and Tunisia and 13 policies in Turkey. Following the scoring methodology described above, priority scores were identified for each policy.

Table 3 summarizes the ranges for the priority scores by country. The priority score varied from a minimum of 12.3 (Turkey) to a maximum of 23.0 (Palestine). The range varied from 7.7 in Palestine to 10.1 in Syria. The results were accumulated in the upper half of the distribution indicating homogenous high perceived importance of most proposed CVD prevention and control policies. Figure 2 presents all the policies for the four countries highlighting the similarities and differences between their priorities. Another way to summarize the resulting scores is by plotting each policy against its priority score in ascending order. This is a visual representation of the most important policies for each country (Fig. 3).

There was some heterogeneity in the policies ranked highest in each country. At the general population level, leading policies were, raising awareness of NCDs in Syria and Tunisia, blood pressure reduction policy through early screening and information campaigns in Palestine and tobacco control in Turkey. Among policies targeting high risk groups, leading policies were as follows: primary prevention of diabetes by increasing Metformin uptake in Turkey and Palestine, and through diet and behavioural change in Syria. Lifestyle modification (including diet, exercise, physical activity) was also ranked highly in Turkey and Tunisia. At the treatment level, leading policies were as follows: multi-drug

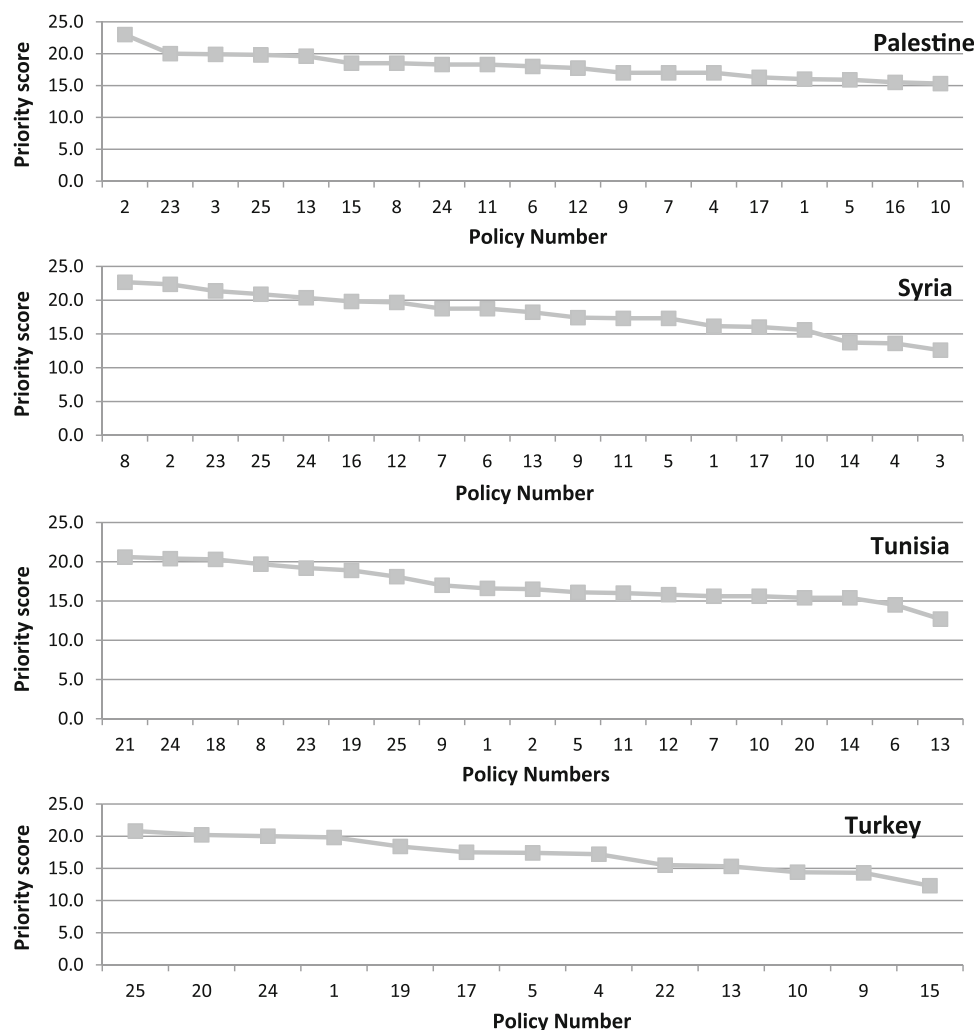




**Fig. 2** Distribution of the four country-specific cardiovascular (CVD) prevention and control policies by priority score generated using a multi-criteria decision analysis applied in four eastern

Mediterranean countries (2011). \*Policy numbers are as mentioned in Supplementary Appendix 3: the performance matrix. *P* Palestine, *S* Syria, *TN* Tunisia, *TR* Turkey

**Fig. 3** Priority scores for different cardiovascular diseases (CVD) prevention and control policy options based on the multi-criteria decision analysis (MCDA) methodology that had been applied in four eastern Mediterranean countries (2011). \*Policy numbers are as mentioned in Supplementary Appendix 3: the performance matrix



regimens for secondary prevention among high risk individuals delivered by primary health care level in Palestine, whilst in Syria, it was the multi-drug regimen for secondary prevention of CVD patients at the tertiary level (hospital treatment of CVD patients). In Tunisia, primary prevention for hypertensive patients using anti-hypertensive medications was the most important policy, whilst in Turkey, it was the multi-drug regimen for

secondary treatment of heart failure in the community. Finally on the health systems' level, improving collaboration between health care providers was rated as the most important policy for both Palestine and Syria, whereas strengthening the primary health care system for CVD patients was given the highest priority for Tunisia, and capacity building of human resources specialized in NCD was rated highest in Turkey.

## Discussion

In this study, we piloted an innovative approach, the MCDA, to rate and prioritize a list of CVD prevention and control policy options identified as “needed” in four EMR countries. The process included multiple stages of identifying CVD prevention and control policies, selecting criteria, rating the policies against the criteria by decision-makers/stakeholders, identifying the priority scores and ranking them in terms of their importance. Our findings suggest that this method is potentially feasible, conclusive and acceptable by various decision-makers and stakeholders who participated in the study.

The strength of this study lies in the approach adopted for decision-making. Decision-making is a highly dynamic process with interaction between different decision-makers and stakeholders. In selecting priorities for a country, decision-makers need to identify which diseases to prevent, for which population, using which intervention and based on which criteria (Baltussen and Niessen 2006). Much of the required evidence can and should be based on scientific evidence. However, research findings and recommendations are sometimes underutilized by decision-makers/stakeholders. In this study, we approached both decision-makers/stakeholders as well as academic researchers. The collaborative nature of this approach in which the decision-makers/stakeholders had a key role in adding, modifying and evaluating the research process helped in reducing the gap between researchers and decision-makers. Successful coordination between different partners was established, and solid networks were created. It is reasonable to assume that this active role for decision-makers and stakeholders in the process of identifying the needs will lead to better understanding of the country-specific situation, although this needs empirical testing in future studies. In terms of demonstrating the ability of decision-makers and researchers to communicate and exchange knowledge and experience, this exercise was successful, as suggested by the high response. At the end of the study, a list of CVD prevention and control policies were generated for each country. These policies were ranked in terms of their importance using a simple way that is understandable, affordable and easy to implement.

Another strength for this study is using multiple criteria in the decision-making process. Having multiple criteria is a key step of the MCDA process. Selecting relevant criteria is a crucial part of the process. The criteria should be selected based on equity and efficiency (World Economic Forum 2011) they can be medical and nonmedical depending on type of policies and aim of the MCDA. Trade-off between different criteria is needed. This can be achieved by assigning different weights to different criteria. If it is not possible to set weights for criteria, then using

a linear additive model to sum scores (as in this pilot study) may be acceptable (Baltussen and Niessen 2006). The criteria selected for this study were mostly nonmedical and related directly to availability of resources. More variability is recommended in future research in order to ensure coverage of various aspects and needs of the community when setting priorities. Other criteria that can be considered in future research include severity of the disease, which is widely used in priority setting. Effectiveness and/or cost-effectiveness can also be considered (Youngkong et al. 2012a). Regarding the number of criteria that should be used, there is no upper limit, but should be limited in practice to avoid information overload.

Clear definitions and scoring scales for each criterion should be identified before implementing the MCDA. The selected criteria should be context specific and can be based on expert opinion. Overlapping in some definitions might lead to redundant results. In our study, there was some overlap between the “core/expanded/desirable criterion” and the “feasibility” criterion, which could have been a source of some confusion. Another issue is considering how to assign weights for different criteria. In real-life situation, different criteria might not have equal influence. Various methodologies are available to assign weights to different criteria. They can start from a simple focus group discussion to a more complicated discrete choice experiment (DCE) (Ryan 2004). Some of these methods have been used in Nepal (Baltussen et al. 2007), the Netherlands (Koopmanschap et al. 2010), Thailand (Youngkong et al. 2012b) and Ghana (Baltussen et al. 2006).

Although the contribution of the decision-makers/stakeholders in this study was promising, the priority scores need rethinking. A narrow range for the priority scores was identified with a minimum score of 12.3/25 (i.e. the priority scores were accumulated in the upper 50 % of the distribution) (see Fig. 2). This implies that all policies were rated as being of relatively high importance by decision-makers and stakeholders. Realistically, especially in resource-constrained settings, a trade-off between different policies is highly needed. Previous experiences have shown limited ability of decision-makers to make such trade-offs resulting in poor achievements (Baltussen and Niessen 2006), and our pilot reflects this. The narrow range of the resulting scores might also be related to the limited number and/or diversity of decision-makers/stakeholders contributing to the study’s results (five from each country). A representative national and more diverse sample of different levels of decision-makers is usually recommended to enrich the process and give generalizable results. Further, patients’ groups and the general public can be included in the process. For example, in Nepal, 66 respondents shared in a MCDA to evaluate whether a lung health programme



is effective and should be implemented. These included decision-makers in health and mid-level health managers—usually health professionals (Baltussen et al. 2007). In Thailand, in a MCDA experiment to rank HIV/AIDs interventions, three groups of raters contributed to the process: decision-makers highly involved in resource allocation, people living with HIV/AIDs and community members (Youngkong et al. 2012b).

Another reason for the narrow range might be the scope of decision-makers/stakeholders who participated. They were from different fields, ranging from high-level decision-makers to mid-level managers and practitioners to academics. However, they were all broadly based within health systems and services in each country. To further improve the prioritizing process, expanding the scope of the decision-makers/stakeholders to include people from outside the health sector is crucial.

One major challenge in this study was to identify individuals and/or parties who are aware of, able to identify and rate the policies against the different criteria. This study highlighted the immaturity of the multi-sectoral collaboration approach and its role in the prevention of disease and improving public health in this region. Multi-sectoral actions for preventing NCDs are not well established in most Arab countries (Jabbour et al. 2012), and adopting the social determinants model for the prevention of CVDs is still underutilized (Marmot 2005). It is worth noting here that most of the global achievements in reducing CVD risk factors have been achieved outside the health sector through public policies including trade, food and pharmaceutical industry, urban development, agriculture, laws, regulations, mass media, fiscal and legislature (WHO 2008, 2011). All these can be possible targets for policies that can affect risk factors for CVDs. Some limited successful examples on multi-sectoral actions for NCDs prevention through lifestyle modifications exist and can be models for replication. Those include the NIZWA healthy lifestyle project in Oman and the Ariana project in Tunisia (Jabbour et al. 2012).

The deliberation process is also important in latter stages of the MCDA, after having input from decision-makers. Whilst the performance matrix allows quantitative analysis of the performance of the interventions against the criteria, deliberation between the researchers and/or the decision-makers/stakeholders provides some clarifications and justifications of the process and analysis (Youngkong et al. 2012a, b) and by this, the priorities will be set based on both quantitative and qualitative analyses.

## Conclusion

Cardiovascular diseases (CVDs) are a top priority in LMIC. Multi-criteria decision analysis (MCDA) is a

pragmatic, rapid, participatory appraisal methodology for setting priorities, which could be easily applied in other middle income countries. It has many applications in health, marketing, agricultural and environmental studies. In this study, MCDA was developed and implemented in close collaboration with decision-makers and other stakeholders. Whilst acknowledging several limitations, full MCDA could be performed to generate evidence-based priority lists. Given the scarce resources and competing priorities in health, MCDA appears to be an affordable and fair decision-making process, and more transparent than traditional ad hoc processes, which may not formally consider relevant evidence. Furthermore, MCDA may help decision-makers to better appreciate the trade-offs between different criteria for different policies in the decision-making process.

In this study, only measures of known effectiveness were shortlisted during the early stages of the process. Later stages were more influenced by expert (decision-makers and stakeholders) opinion. We suggest this use of evidence might be appropriate in LMIC. We recommend applying this methodology in a systematic way, going through the different stages described above. Ensuring the diversity and representation of decision-makers/stakeholders as a critical component of the MCDA, which—if applied correctly—can be powerful evidence-based priority-setting tool.

**Acknowledgments** This research received funding from the European Community's Seventh Framework Programme (FP7/2007–2013) under Grant Agreement No. 223075—the MedCHAMPS project. We also would like to thank the MedCHAMPS working teams (The MedCHAMPS project team comprises: Julia Critchley (St Georges, University of London and Newcastle University, UK), Balsam Ahmad, Peter Phillimore, Shahaduz Zaman (Newcastle University, UK), Simon Capewell, Martin O'Flaherty, Mukesh Dhehani (University of Liverpool, UK), Ilonca Vartjes (University of Liverpool, UK, and University of Utrecht, NL), Kathleen Bennett (Trinity College Dublin, Ireland), Deniz Altun, Hale Arık, Özgür Aslan, Yücel Demiral, Sinem Doganay, Gül Ergör, Gül Gerçeklioğlu, Bülent Kilic, Gül Saatli, Hatice Şimşek, Kaan Sözen, Belgin Unal (Dokuz Eylül University, Turkey), İlhan Satman (Istanbul Faculty of Medicine, Istanbul, Turkey), Sibel Göğen (Primary Health Care General Directorate, Turkish Ministry of Health, Turkey), Sibel Kalaca (Marmara University, Istanbul, Turkey) Radwan Al Ali, Madonna Elias, Fouad Fouad, Samer Rastam, Nesrien Soulaïman, Ghmaez Moukeh (Syrian Center for Tobacco Studies, Aleppo, Syria) Wasim Maziak (Syrian Center for Tobacco Studies, Aleppo, Syria) and Florida International University, Miami, US) Maher Abou Mayaleh (Aga Khan Foundation, Hama, Syria), Niveen Abu-Rmeileh, Rula Ghandour, Abdullatif Hussein, Samer Jaber, Rana Khatib, Rasha Khatib, Nahed Mikki, Azza Shoaibi (Birzeit University, Birzeit, oPt), Heidar Abu-Kteish (Palestinian Medical Relief Society, oPt), Waffa Aissi, Riadh Allani, Chokra Arfa, Latifa Beltaifa, Nadia Ben Mansour, Habiba Ben Romdhane, Olfa Lassoued, Olfa Saidi, Faten Tlili (Cardiovascular Epidemiology and Prevention Research Laboratory, Tunis, Tunisia) Nourredine Achour (Institut National de Santé Publique, Tunis, Tunisia), Nabil Ben Salah (Research Department, Ministry of Health, Tunisia), Helen Mason, Marissa Collins (Glasgow

Caledonian University, UK), Gojka Roglic (WHO Geneva, Switzerland), Ibtihal Fadhil (Regional Adviser NCDs, WHO EMRO, Cairo, Egypt), Nigel Unwin (Newcastle University and University of the West Indies, Georgetown, Barbados).

## References

- Abu-Rmeileh N, Shoaibi A, O'Flaherty M, Capewell S, AH (2012) Analysing falls in coronary heart disease mortality in the West Bank between 1998 and 2009. *BMJ Open* 2:e001061
- AHPSR (2004) Strengthening health systems: the role and promise of policy and systems research. Alliance for Health Policy and Systems Research, Geneva
- Baltussen R, Niessen L (2006) Priority setting of health interventions: the need for multi-criteria decision analysis. *Cost Eff Resour Alloc* 4:14
- Baltussen R, Stolk E, Chisholm D, Aikins M (2006) Towards a multi-criteria approach for priority setting: an application to Ghana. *Health Econ* 15(7):689–696
- Baltussen R, ten Asbroek AHA, Koolman X, Shrestha N, Bhattarai P, Niessen LW (2007) Priority setting using multiple criteria: should a lung health programme be implemented in Nepal? *Health Policy Plann* 22(3):178–185
- Bots PWG, Hulshof JAM (2000) Designing multi-criteria decision analysis processes for priority setting in health policy. *J Multi Criteria Decis Anal* 9(1–3):56–75
- Bowman S, Unwin N, Critchley J, Capewell S, Hussein A, Maziak W, Zaman S, Ben Romdhane H, Fouad F, Phillimore P, Unal B, Khatib R, Shoaibi A, Ahmad B (2012) Use of evidence to support healthy public policy: a policy effectiveness-feasibility loop. *Bull World Health Org* 90(11):847–853
- Epping-Jordan JE, Galea G, Tukuitonga C, Beaglehole R (2005) Preventing chronic diseases: taking stepwise action. *The Lancet* 366(9497):1667–1671
- Gibson JL, Martin DK, Singer PA (2004) Setting priorities in health care organizations: criteria, processes, and parameters of success. *BMC Health Serv Res* 4(1):25
- Jabbour S, Giacaman R, Khawaja M, Nuwayhid I (eds) (2012) Public health in the Arab World, 1st edn. Cambridge University Press, New York
- Kapiriri L, Norheim OF (2004) Criteria for priority-setting in health care in Uganda: exploration of stakeholders' values. *Bull World Health Org* 82:172–179
- Koopmanschap MA, Stolk EA, Koolman X (2010) Dear policy maker: have you made up your mind? A discrete choice experiment among policy makers and other health professionals. *Int J Technol Assess Health Care* 26(02):198–204
- Marmot M (2005) Social determinants of health inequalities. *Lancet* 365(9464):1099–1104
- Maziak W, Critchley J, Zaman S, Unwin N, Capewell S, Bennett K, Unal B, Hussein A, Romdhane HB, Phillimore P (2013) Mediterranean studies of cardiovascular disease and hyperglycemia: analytical modeling of population socio-economic transitions (MedCHAMPS)-rationale and methods. *Int J Public Health* 58(4):547–553
- Mendis S, Alwan A (2011) A prioritized research agenda for prevention and control of noncommunicable diseases. World Health Organization, Geneva
- Miranda JJ, Kinra S, Casas JP, Davey Smith G, Ebrahim S (2008) Non-communicable diseases in low- and middle-income countries: context, determinants and health policy. *Trop Med Int Health* 13(10):1225–1234
- Phillimore P, Zaman S, Ahmad B, Shoaibi A, Khatib R, Khatib R, Hussein A, Fouad F, Elias M, Maziak W, Tlili F, Tinsa F, Ben Romdhane H, Kılıç B, Kalaça S, Ünal B, Critchley J (2013) Health system challenges of cardiovascular disease and diabetes in four Eastern Mediterranean countries. *Glob Public Health* 8(8):875–889
- Rudan I, Gibson JL, Ameratunga S, El Arifeen S, Bhutta ZA, Black M, Black RE, Brown KH, Campbell H, Carneiro I, Chan KY, Chandramohan D, Chopra M, Cousens S, Darmstadt GL, Meeks Gardner J, Hess SY, Hyder AA, Kapiriri L, Kosek M, Lanata CF, Lansang MA, Lawn J, Tomlinson M, Tsai AC, Webster J (2008) Setting priorities in global child health research investments: guidelines for implementation of CHNRI method. *Croat Med J* 49(6):720–733
- Ryan M (2004) Discrete choice experiments in health care. *BMJ* 328(7436):360–361
- Viergever RF, Olifson S, Ghaffar A, Terry RF (2010) A checklist for health research priority setting: nine common themes of good practice. *Health Res Policy Syst* 8:36
- WHO (2011) Global status report on noncommunicable diseases 2010. World Health Organization, Geneva
- World Economic Forum (2011) From burden to “best buys”: reducing the economic impact of non-communicable diseases in low- and middle-income Countries. World Economic Forum and World Health Organization
- World Health Organization (2008) 2008–2013 action plan for the global strategy for the prevention and control of noncommunicable diseases. WHO
- World Health Organization (2011) Global status report on noncommunicable diseases 2010. World Health Organization, Geneva
- Youngkong S, Baltussen R, Tantivess S, Mohara A, Teerawattananon Y (2012a) Multicriteria decision analysis for including health interventions in the universal health coverage benefit package in Thailand. *Value Health* 15(6):961–970
- Youngkong S, Teerawattananon Y, Tantivess S, Baltussen R (2012b) Multi-criteria decision analysis for setting priorities on HIV/AIDS interventions in Thailand. *Health Res Policy Syst* 10:6